BUREAU OF MEDICAL SERVICE.

International Exhibition.

—1876—

UNITED STATES CENTENNIAL COMMISSION.

Bureaus of Administration.
MEDICAL SERVICE.

Philadelphia, January 1, 1877.

A. T. GOSHORN, ESQ.,

Director-General.

DEAR SIR,—I have the honor to herewith submit the report of the Medical Bureau of the International Exhibition.

Very respectfully yours,

WILLIAM PEPPER, M.D.,

Medical Director.

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REPORT OF THE DIRECTOR

OF THE

BUREAU OF MEDICAL SERVICE.

The functions of the Medical Department were to supply medical and surgical assistance within the Exhibition grounds; to advise with reference to sanitary questions; and to issue in authoritative form such information on the sanitary condition of Philadelphia and of the Exhibition as might be desirable. The important subjects of the drainage and water supply of the Exhibition grounds were placed entirely under the control of the Chief Engineer of the grounds.

The Medical Department was organized in the early part of 1876, by the appointment of a Medical Director, a staff composed of six Medical Officers, and a Secretary, who was also the Resident Physician at the Hospital in the Exhibition grounds.

MEDICAL DEPARTMENT.

MEDICAL DIRECTOR,

WILLIAM PEPPER, M.D.

OFFICERS OF MEDICAL STAFF,

JACOB ROBERTS, M.D.,
S. W. GROSS, M.D.,
H. C. WOOD, JR., M.D.,
ROLAND G. CURTIN, M.D.,
HAMILTON OSGOOD, M.D.,
DE FOREST WILLARD, M.D.

RESIDENT PHYSICIAN AND SECRETARY.

THEODORE HERBERT, M.D.

[There were also employed a nurse, two apothecaries, and four attendants and clerical assistants.]

The Hospital was centrally located in Landsdowne Ravine, on Landsdowne Avenue, between Agricultural and Belmont Avenues. Its position was retired, well shaded, and quite picturesque. The

building was a one-storied frame structure, 64 feet by 32 feet, well lighted and ventilated, and conveniently arranged, having a large waiting-room, No. 1, 19 feet 6 inches by 19 feet 6 inches; the office of the Medical Staff and of the Apothecary, No. 2, 19 feet 6 inches by 12 feet 6 inches; the office of the Director and Secretary, No. 3; the private room of the Resident Physician, No. 4; two wards, Nos. 5 and 6, for male and female patients, each 16 feet by 20 feet; two bath-rooms, and a private room for the nurse. It was furnished with every necessary convenience and comfort, and in every way answered the purposes for which it was intended. Bureau of Medical Service. Description of Hospital.

The Hospital was first occupied on the opening day of the Exhibition, May 10, and from that time until November 15, when the Exhibition was finally closed to the public, the above organization was maintained in efficient operation.

The experience of previous International Exhibitions has been that exaggerated statements are circulated as to the bad sanitary condition of the cities in which they have been held; and a circular (No. 1) was accordingly issued, April 15, 1876, in which the sanitary condition of Philadelphia was fairly represented.* This circular was widely distributed, and was extensively reprinted at home and abroad. Circular No. 1

Prior to the opening of the Exhibition the duties of the Medical Department were chiefly limited to the care of the employees engaged in the construction of the various buildings or in the preparation of the grounds, and of the attachés of the Foreign Commissions, who early began to take up their residence within the grounds. It is a gratifying fact that although many thousands of workmen were engaged for eighteen months in the construction of the buildings, the number of casualties was very small. In order to provide fully for these, Dr. Herbert was at an early day stationed in a convenient office on the grounds, so that all such cases might receive immediate attention. As there was telegraphic communication with the nearest general hospital, that connected with the University of Pennsylvania, there was no delay in having any serious case transferred in an ambulance to its wards. Casualties among employees.

With the opening of the Exhibition began the active work of the Medical Department, but for the first few weeks the public evidently were not fully aware of its existence. It is probable that from this cause many cases of sickness, occurring during this time, did not come to the Hospital for relief. This was remedied by an announce-

* See Exhibit A, Circular No. 1, p. 673.

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ment, which was posted throughout the Exhibition Buildings and grounds.*

Stretchers and ambulance.

Owing to the great number and size of the buildings, and the distances between them, it was necessary to place stretchers at numerous points in each of the principal buildings and about the grounds. The guards were especially instructed to promptly convey to the hospital any person requiring medical relief. In addition to this an ambulance was kept standing in constant readiness to be dispatched to any part of the grounds for cases of a more serious character. The ambulance was also used in exceptional cases for conveying patients to their residences in the city, or to one of the neighboring hospitals, after the hours of the Exhibition.

For the efficient and satisfactory working of the Hospital Department the following rules were issued:

Rules of the Bureau.

1. The Hospital building does not contain any exhibit; it is intended solely for medical purposes, and, as its wards are always occupied, visitors will not be admitted. Information concerning the Department can be obtained from the Resident Medical Officer.

2. All medical relief furnished at the Hospital building being gratuitous, under no circumstances will any remuneration be received for services rendered. No medicines will be sold, nor will any be dispensed excepting upon the prescription of the officers of the Department.

3. In order to avoid undue publicity of personal details, the record of the daily work of the Hospital furnished to the agents of the public press will embrace only the number and general character of the cases treated.

4. No patient will be permitted to remain in the Hospital building over night. All patients remaining in its wards at the hour of closing the Exhibition will be transported to their residence by the ambulance or by private conveyance.

5. All employees of the Board of Finance, of the Centennial Commission, and of Foreign Commissions requiring medical treatment, shall report daily to the Resident Medical Officer, at such an hour previous to the opening of the Exhibition as he shall designate.

6. Any case of serious sickness occurring among the employees must be reported without delay to the Resident Medical Officer, who shall immediately have the patient removed to his own residence or to one of the neighboring civil hospitals.

Health of resident population.

In proceeding to the consideration of the medical statistics of the Exhibition, it will be convenient to allude first to the sickness occurring among the population resident within the grounds. In this connection it is important to determine what was the average extent of this population during the period of the Exhibition, though it is impossible to do this with entire accuracy, on account of the constant changes in the number of persons domiciled at the several State headquarters. It may, however, be estimated that the average daily population for the twenty-seven weeks was 1568. The highest daily average was 1817, during the week ending May 27, and the lowest daily average was 1382, during the week ending November 10.

* See Exhibit A, Circular No. 2, p. 674.

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Centennial Exposition
Philadelphia 1876

MEDICAL SERVICE.

Presented to the
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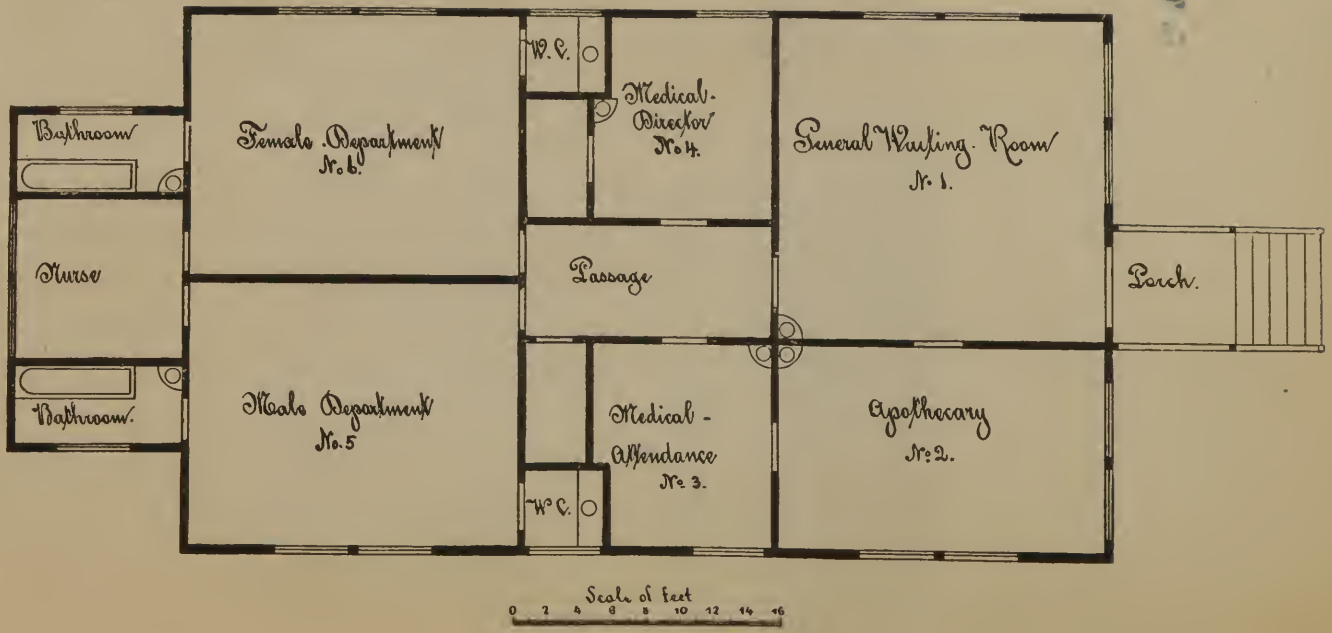

GROUND-PLAN OF HOSPITAL.

HOSPITAL, BUREAU OF MEDICAL SERVICE, INTERNATIONAL EXHIBITION, 1876.

The population was distributed as follows: Bureau of Medical Service.

Residing at the several restaurants, daily average	256
Residing at the buildings of the several foreign Commissions, daily average	103
Residing at the several State buildings, daily average	88
In the employ of the United States Government, daily average	91
" " " Board of Finance:	
Centennial Guard, daily average	802
Firemen, daily average	175
Janitors and others, daily average	53
Total	1568

Resident population.

Before considering the amount of sickness occurring among this population, attention is due to the peculiar conditions involved. In the first place, among the numerous representatives of foreign countries quartered within the grounds, most of whom were sufficiently well housed and provided for, there were not a few who suffered severely from the exceptional weather of 1876—the keen cold of the early months of the year, as well as the intense heat of the summer. Unfortunately, too, some of those whose native climate would render them most susceptible to these extremes were not suitably provided for, in either lodging or food. This was particularly the case with the Japanese, who numbered about fifty; and whose dwelling, although a beautiful model of Oriental taste and workmanship, was barely suitable as a residence during the cool weather of an ordinary Philadelphia spring or fall. It was a frame structure of the lightest description, with no provision for heating excepting a small shallow box, filled with sand, placed in the centre of each room, upon which were kept burning a few small pieces of charcoal. It may be imagined, therefore, how ill fitted this was as a residence, not only during the severe winter months, but even during April, May, September, and October. It is to be noted, in connection with this mode of heating the apartments of the Japanese dwelling, that, as there was no outlet for the fumes of the burning charcoal, nor indeed any aperture whatever for ventilation when the rooms were closed, as they constantly were during cool weather, the inmates were subjected to a most unwholesome atmosphere. These depressing influences, in connection with their meagre diet, caused considerable sickness among the Japanese. The chief forms of indisposition were diarrhœal affections, attended with an unusual degree of general prostration, which yielded readily to treatment, but were apt to recur. In addition to this, the want of acclimation and the depressing influences just mentioned, strongly predisposed them to contract febrile affections of typhoid type. Thus, out of about 50 individuals, including the members of the Japanese Commission and

Peculiarities of Japanese dwelling-house.

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the Japanese exhibitors, there were 9 cases of typhoid and typho-malarial fever. These cases were all treated at the University Hospital, and all recovered. They were of a rather mild type, with a peculiar absence of diarrhœa and of symptoms of nervous disturbance. Although the cases were not severe, it was further noted that the convalescence was unusually slow and protracted.

Health of English residents.

Among the English residents, of whom there were 36,—next in number to the Japanese,—there was a moderate amount of diarrhœa, but only two cases of typhoid fever, both of which recovered. In marked contrast to the unhealthfulness of the Japanese colony is to be placed the excellent sanitary conditions of the cottages for the employees of the British Commission.

Composition of Centennial Guard.

The most important question in connection with this part of our subject concerns the health of the Centennial Guard. This body, which originally consisted of 1176 men, was selected with great care as to their physical fitness. It comprised representatives of twenty-five States; the largest number from any one being 608 from Pennsylvania, of whom only 197 were from Philadelphia, so that over 80 per cent. of all were from country districts. This fact has an important bearing upon the liability to continued febrile affections conspicuously displayed by the members of this force. In regard to occupation, about 50 per cent. of all had been engaged, prior to their enrolment, in in-door pursuits (as clerks, store-keepers, printers, shoemakers, etc.), which gave the worst possible preparation for the very exposing and trying duties assigned to them as members of the Guard. Indeed, of the 50 per cent. who had previously been engaged in what we have classed as out-door pursuits, as distinguished from those which were purely sedentary and in-door, there were several large groups (such as sailors, machinists, blacksmiths, etc.) who were not especially well-fitted to bear protracted exposure to intense summer-heat. An examination of the ages of the men enrolled, shows that every year from 21 to 53 inclusive was represented. The following table shows the relative number enrolled for each period of five years from 21 onwards:

Age of the Guard.

From 21 to 25 years inclusive	223 men.
" 26 to 30 " "	340 "
" 31 to 35 " "	288 "
" 36 to 40 " "	211 "
" 41 to 45 " "	95 "
" 46 to 50 " "	12 "
Over 50 years of age	7 "
Total	1176 "

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Although the number of men actually enrolled in the Guard was 1176, the daily average during the entire period of the Exhibition was only 802. The reduction in numbers was a gradual one, and, so far as is known, does not impair the general accuracy of the proportions we have given. Attention has been called to the above details about the composition of the Guard, because it is evident that they exerted a large influence upon the high rate of sickness which afterwards prevailed among them.

Uniform and barracks.

Owing to the unusual heat of the season, the uniform which was adopted proved to be much too heavy and oppressive. It must also be observed that, in the construction of the barracks in which the Guard were quartered, sufficient attention was not paid to securing free ventilation or sufficient cubic feet of breathing space. It is probable that both the health and comfort of the Guard would have been better served by requiring the men to be within the grounds only while on duty and allowing them to quarter themselves outside.

Sickness among the Guard.

It was inevitable, in consideration of the composition of the Guard, their arduous duty, and the extreme heat to which they were exposed, that a considerable amount of sickness should have occurred among them. This showed itself chiefly in the forms of diarrhœal and febrile affections and of solar exhaustion. The diarrhœa was of a simple character and amenable to treatment, so that it rarely necessitated the patient's being off duty. The forms of fever which presented themselves were simple intermittent, typho-malarial, and typhoid. Nearly all cases of intermittent fever occurred among those who had suffered previously with the same affection within eighteen months. In no instance did it appear that the disease was contracted for the first time upon the Exhibition grounds. It is a well-known fact that, in those who have once suffered from malaria, any cause of nervous exhaustion, such as exposure to extremes of temperature or excessive exertion, may reproduce the symptoms of fever without there having been any fresh exposure to malarial miasm. When it is further noted that nine-tenths of the cases of intermittent fever among the Guard and other residents within the grounds occurred during the months of June, July, and August, it is clear that there cannot be said to have been any marked degree of malaria about this locality. During these three months, which were characterized by extreme and dry heat, the climatic conditions were very unfavorable to the development of the malarial poison; while during the later months of the Exhibition, including the period when malaria is usually most prevalent, it was found that not more than three or four mild cases occurred.

Absence of malaria.

Of the other forms of fever mentioned, typho-malarial and typhoid,

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it is important to speak more at length, since the attention not only of the medical profession but of the public was prominently directed to this subject. As, however, its chief interest concerned the health of the public at large more than that of the Guard, its consideration will be found in a later part of this report. (See pages 667–672.)

Typhoid fever among the Guard.

It is difficult to determine accurately the number of cases of typhoid fever occurring among the Guard. This is chiefly because, on the development of any symptoms of a suspicious character, the patients were in most instances removed to their homes, and all future record of the cases was lost. It is certain, however, from the observation of cases of this character sent to Philadelphia hospitals, that many of them proved to be simple diarrhœa, with unusual prostration. On the whole, it may be said that not more than from 25 to 30 cases of true typhoid or typho-malarial fever occurred among the Guard, whose average number during the months of May, June, July, and August, during which time all of the cases of fever originated, was 870. When we recall the conditions upon which we have dwelt as rendering the members of the Centennial Guard unusually liable to these febrile affections, it becomes evident that the specific causes of typhoid and typho-malarial fevers did not exist in any high degree of intensity at the Exhibition grounds.

Mortality among the Guard.

The total number of deaths known to have occurred among the Guard is 8, from the following causes:

Typhoid and typho-malarial fevers, after removal to their homes in other States	3
Typhoid and typho-malarial fevers, after removal to hospital	3
Organic disease of the heart, with rupture, after removal to hospital	1
Variola, after removal to hospital	1

Isolated cases of smallpox and measles.

In connection with this latter case, it is interesting to observe that it was developed in one of the Guard who was quartered in a crowded barrack, and that it was the only case of smallpox that occurred. In like manner, a single isolated case of severe measles presented itself in a different barrack.

In further confirmation of the view that the causes of the typhoid fever which occurred were general in their character, and connected with peculiar atmospheric conditions and with the peculiar composition of the population resident within the grounds, there should be mentioned, first, that the cases all occurred during the months of May, June, July, and August; and, secondly, that they were quite evenly distributed over the extensive grounds; thus there were cases among the Guard at the barracks on George's Hill, among the Japanese and English at their quarters on the Hill, among the guard at the Fifty-second Street

barracks, among those at the barracks at the eastern end of the Main Building, among those at the barracks at the northeastern extremity of the grounds, and among those at the barracks immediately in front of the Hospital, which was almost in the centre of the inclosure. It seems remarkable that at the barracks of Company G, which was situated in Belmont Ravine, between the Kansas and Colorado Building and Agricultural Hall, there was not a single case, as this location seemed to present the least favorable hygienic conditions of all.

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Apart from the diarrhœa and fevers which have been spoken of, the general health of the Guard was good, the only ailments being of a very trivial character.

General health of Guard good.

It may be stated, in conclusion, that, considering the great exposure of the Guard, of the employees, and of the attachés of Foreign Commissions during the cold inclement weather of March and April, and later during the unprecedented heat of June, July, and August, their health was better than could have been anticipated.

As yet there have been considered only those sanitary questions connected with the population resident within the grounds. It now remains to examine the interesting questions which concern the extraordinary number of visitors who thronged the Exhibition during the twenty-seven weeks of its continuance.

Sanitary statistics of visitors to the Exhibition.

As already stated, during the first few weeks it was not generally known to visitors that provision for medical relief had been made. In view of the frequent calls subsequently made upon the Department, and the valuable assistance rendered in many cases, it seems desirable that hereafter in similar Exhibitions the Medical Bureau should be organized at a very early date, and that the attention of the public should be called to it in the clearest possible manner.

Medical Bureau should be organized early.

On the opening day, May 10, although there were 186,672 visitors, there would seem to have been no serious accidents, since but 5 cases applied at the Medical Department, 3 of which were slight injuries and 2 were cases of exhaustion. It is probable, however, that there were many other similar cases which were removed directly to their homes, and of which consequently no record has been kept. From that date to the closing day (159 days in all), 6463 cases were treated, making a daily average of about 41.

Total number of cases treated at Hospital.

The following analysis of the actual residences of the cases, although of course not in any way proving that the same proportions held in regard to the entire number of visitors, is of interest:

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Residences of patients.

I.—RESIDENCES OF PATIENTS.

Austria	2	West Indies	1	Nebraska	7
Bavaria	1	Alabama	14	Nevada	2
Belgium	4	Arkansas	7	North Carolina	14
Bohemia	1	California	32	New Hampshire	66
Brazil	3	Colorado	8	New Jersey	249
Canada	68	Connecticut	292	New York	1268
Cuba	1	District of Columbia	65	Ohio	318
England	55	Delaware	42	Oregon	1
France	23	Florida	9	Pennsylvania	2104
Germany	21	Georgia	18	Rhode Island	58
Ireland	11	Illinois	116	South Carolina	11
Italy	4	Indiana	97	Tennessee	15
Japan	32	Iowa	64	Texas	11
Jerusalem	1	Kansas	21	Vermont	79
Norway	1	Kentucky	20	Virginia	58
Nova Scotia	11	Louisiana	6	Wisconsin	48
Poland	1	Massachusetts	495	Not known	165
Portugal	1	Maryland	139	Total	6463
Prussia	4	Maine	42		
Russia	13	Michigan	163	United States	6016
Syria	2	Minnesota	7	Foreign countries	282
Scotland	2	Mississippi	16	Not known	165
Sweden	12	Missouri	33	Total	6463
Turkey	7	Montana	1		

It is seen from the above table that 93 per cent. of all persons treated were residents of the United States, representing 39 States and Territories; while but 4.36 per cent. of all were from foreign countries. Of those from the United States, 35 per cent. were from Pennsylvania, 21 per cent. from New York, 7.6 per cent. from Massachusetts, 4.9 per cent. from Ohio, 4.5 per cent. from Connecticut, and 3.8 per cent. from New Jersey. Of those from foreign countries, 55 were from England, 32 from Japan, 23 from France, and 21 from Germany.

Sex of patients

Of the total number of cases (6463), 1799 were females and 4664 were males.

Ages of patients.

II.—AGES OF PATIENTS.

Ages.	Males.	Females.
Under 1 year	5	1
1 to 5 years	17	9
5 to 10 "	51	26
10 to 20 "	449	222
20 to 40 "	2348	759
40 to 60 "	885	285
60 to 80 "	145	38
80 to 100 "	1	2
Not given	763	457
Total	4664	1799

The oldest patients included in the above table were one man aged 81, and two women aged respectively 95 and 96 years; while, on the other hand, the youngest patients were 2 and 4 weeks respectively.

The following tables present a summary of the principal causes of sickness among the visitors to the Exhibition during the twenty-seven weeks of its continuance: Bureau of Medical Service.

III.—MEDICAL CASES.

Analysis of medical and surgical cases treated at the Hospital.

Respiratory and Circulatory Diseases.	
Asthma	9
Hay asthma	2
Bronchitis	135
Hæmoptysis	13
Organic disease of heart	8
Palpitation of heart	13
Miscellaneous	66
Total	246
Digestive Diseases.	
Cholera infantum	1
Cholera morbus	151
Diarrhœa	1686
Dysentery	19
Indigestion	499
Cramps	487
Constipation	215
Miscellaneous	141
Total	3199
Nervous Diseases.	
Apoplexy	2
Headache	356
Neuralgia (including toothache and earache)	364
Epilepsy	28
Hysteria	50
Insanity	2
Vertigo	55
Menière's disease	1
Miscellaneous	7
Total	865
Fevers.	
Simple fever	27
Intermittent fever	212
Remittent "	5
Typhoid "	6
Total	250
Effects of Heat.	
Heat exhaustion	29
Thermal fever	10
Sun-stroke	2
Total	41
Effects of Over-exertion.	
Debility and exhaustion	266
Faintness and syncope	44
Total	310
Intemperance	10
Miscellaneous medical cases	596
Total medical cases	5519

IV.—SURGICAL CASES.

Wounds.	
Bites and stings	25
Contused wounds	56
Incised wounds	73
Lacerated wounds	100
Gunshot wounds	3
Punctured wounds	11
Total	268
Accidents and Injuries.	
Scalds	14
Burns	12
Contusions	96
Dislocations	4
Sprains	64
Fractures	12
Fractured larynx	1
Concussions	4
Foreign body in eye	192
Foreign body in ear	1
Foreign body in throat	4
Hernia	4
Hernia (strangulated)	6
Total	414
Miscellaneous surgical cases	262
Total surgical cases	944
Medical cases	5519
Surgical cases	944
Total	6463

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About one-fourth of these cases were of such severity as to require admission to the Hospital wards, while the remainder were capable of being immediately relieved. In the vast majority of cases the patients admitted to the wards recovered so speedily as to be able to return home without aid. In not more than 35 instances during the entire season did the patients continue so ill as to make it necessary to have them conveyed to their homes in the ambulance when the Hospital was closed at nightfall. In no instance was it necessary to deviate from the rule of the Department, that no case of sickness should remain in the Hospital building over night.

It will be observed that 3199, or more than one-half the entire number of medical cases, were connected with the digestive organs. Although the majority of these originated at the Exhibition, a considerable number were cases of longer standing. It is important to note this, not only in connection with this class of affections, but with all the other classes, since, in reality, a considerable proportion of the cases were in no way chargeable to the visit to the Exhibition. Thus, so soon as it became generally known that gratuitous medical advice could be had, a large number of persons with chronic affections of a medical or surgical character applied at the Department for relief. It was thought expedient not to refuse such applications, although they were recognized as an abuse of the Medical Department, which was intended solely for the relief of cases of emergency.

Chronic cases.

Causes of diseases of digestive organs.

The great majority of the cases of digestive disturbance were directly traceable to excesses or indiscretions in eating; and, when it is remembered that such vast numbers of persons, collected from all classes of society and accustomed to all varieties of occupation and climate, were exposed to the combined influence of excessive fatigue and excitement, of extreme heat and of irregular diet and hours of eating, it is truly remarkable that sickness from these causes was not vastly more common. It should also be observed that in supplying the enormous demand for certain articles of food it must occasionally have happened that supplies of inferior quality were used. This was particularly the case with regard to articles of such perishable character and of such general consumption as milk, meat, eggs, etc. A forcible illustration of this was given on the 11th of July, when no less than 26 patients with severe cholera morbus were admitted to the hospital in the course of an hour and a half, all of whom had been taken ill soon after partaking of a lunch of pie and milk at one of the restaurants. It cannot be doubted that this violent outbreak was dependent upon some subtle organic change in one of the articles mentioned, probably the milk, by which it acquired highly irritant poisonous qualities.

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Probably, however, sickness was less frequently caused by such spoiled or tainted provisions than by excessive fatigue in very hot weather, by the copious use of iced drinks of all kinds while the body was greatly overheated, and by the consumption of indigestible articles of food when in a state of great physical exhaustion. Vast numbers of those who visited the Exhibition did so at great personal and pecuniary sacrifice. Every effort was made, therefore, to condense their visit to all parts of the Exhibition into the shortest possible time, and it is difficult to conceive of the excessive fatigue and exhaustion involved in this attempt. A large proportion of the visitors were women or young persons entirely unfitted for enduring the physical fatigue of a succession of long days, spent on foot, in constant motion, in the midst of vast throngs of people, and with the mind overtaxed with the ever-changing novelties and attractions of the scene. Very many of the visitors came from localities whose climates differed widely from that which they here found. They abruptly changed all their habits of living, and, in too many instances, neglected the hygienic rules which are essential to health.

Conditions favoring sickness on part of visitors.

Drinking-water did not act in any way as a cause of disease.

During the later months of the Exhibition, there were unfavorable reports circulated in regard to the purity of the drinking-water supplied to the Exhibition grounds and the neighboring portion of West Philadelphia; but careful investigation showed that they were unfounded. The water was drawn from the Schuylkill River at a point opposite the Exhibition grounds. It is true that, in the extreme haste with which many of the small buildings within the inclosure were erected, the rules issued on this subject were disobeyed in a few instances, and wells were constructed having connection with one or the other of the two small streams which flowed through the grounds and emptied into the river not far from the above point. In every case, however, this was soon detected and instantly corrected. Any contamination of the water supply from such a source could only have occurred during the first few days of the Exhibition. As a matter of fact, no sickness occurred during this period. Careful analyses were made at short intervals by Dr. C. M. Cresson, which showed that the purity of the water taken from this point of the Schuylkill was fully up to the standard of previous years as well as to that of the water supply of neighboring cities. The most conclusive evidence, however, on this point is to be drawn from the actual experience of the large number of persons who drank the water freely during the entire period of the Exhibition, but who were not exposed to the various causes of sickness which influenced the Guard and visitors. In no single instance did any sickness of a

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typhoid or diarrhœal character occur. We have already seen that the amount of typhoid fever among the Guard was small, taking into consideration the peculiar composition of that body, and, further, that the cases which occurred took place within a limited period, marked by unusual meteorological conditions, while the water supply remained unchanged. Finally, we have seen that the cases of diarrhœa occurring among the Guard were light in character and readily amenable to treatment, though all the time the patients were using large quantities of this drinking-water.

Exhibition grounds and vicinity free from any special cause of disease.

As a further evidence of the fact that no special cause of typhoid fever existed at the Exhibition grounds or in their vicinity, it may be stated that in the Twenty-fourth Ward, which embraces almost the whole of Fairmount Park and all of the adjoining portion of the city, the total number of deaths from typhoid fever for the entire year was 44, of which 30 occurred between May 10 and November 10. The population of this ward in 1875 was 41,310, but during the Exhibition period it may be safely estimated—in consideration of the large temporary hotels, all of which were included in this ward, and the enormous number of boarding-houses and private residences which were constructed for the occasion—that the population was at least 75,000, which gives a rate of mortality per 1000 from typhoid fever during this period of only .4.

Conclusions as to sanitary conditions of grounds.

In conclusion, we may state, as the result of careful study of this question of the sanitary condition of the Exhibition grounds, in regard to which so much was said at the time:

First, that there is no evidence to show that any special cause of sickness existed there.

Second. That with regard to the supply of drinking-water in particular, there is no evidence to show that its use predisposed either to typhoid fever or to diarrhœal affections.

Third. That the sickness occurring among the Guard and employees resident within the grounds was due to peculiar causes above considered, which were in no way connected with the sanitary condition of the grounds.

Fourth. That the sickness occurring among the visitors, which was actually dependent upon their visit to the Exhibition, was due exclusively to the effects of over-fatigue, indiscretions in eating and drinking, undue exposure to great heat or to inclement weather, etc.

It remains now in connection with the record of sickness among the visitors to allude to a few peculiarities.

A considerable number of cases showed, as would have been expected, the injurious effects of the extreme heat. Doubtless, this

cause aided in producing many of the cases classed as simple exhaustion. The cases, however, in which sickness was directly traced to the effect of heat were 41 in number, of which 32 occurred between the 25th of June and the 22d of July, during which four weeks the average temperature was 81¾° F. The majority of cases, 29 in number, presented the ordinary symptoms of nervous exhaustion following upon exposure either to the direct rays of the sun or to a very high degree of temperature within-doors. In the 10 cases recorded as thermal fever, the symptoms were much more severe. The patients were still conscious, or in some cases delirious; there was intense heat of surface, congestion of the eyes, deep flushing of the face, and great rapidity of the pulse. These cases were treated by immersion in baths of ice-water, and promptly recovered. The 2 cases recorded as sun-stroke were characterized by sudden and alarming development of temperature, the patients almost instantly passing into a state of coma with stertorous respiration, with livid congestion of the face and surface, and with extremely small and rapid pulse. They were stripped and were then vigorously rubbed with pieces of ice until a marked reduction of temperature took place. As this occurred, consciousness returned, followed in both cases by rapid recovery.

Bureau of Medical Service.

Direct effects of heat.

In regard to the class of nervous diseases, there are several points of interest to be noted. Thus, there were but two cases of apoplexy, one of which occurred in an intemperate man, and proved almost immediately fatal, while the other was a mild attack, probably of localized apoplectiform congestion of the brain, occurring in a young man engaged as a chair-pusher, an occupation which involved exhausting effort and prolonged exposure to the sun. There were only 28 cases of epilepsy treated at the hospital among 9,910,966 visitors to the Exhibition. It is of course highly probable that very many more epileptics were included in this number who were not so unfortunate as to have an accession of their terrible malady while within the grounds. The cases recorded as vertigo were almost exclusively dependent upon indigestion. As a matter of purely medical interest, it may be mentioned that a single case of that rare affection, Meniére's disease or labyrinthine vertigo, presented itself at the Department.

Nervous diseases.

The only remark to be made in connection with the class of respiratory and circulatory diseases is to call attention to the very small number of cases, only 21, who were attacked with disturbance of the heart, either due to functional or organic disease; as well as to the very small number of cases of hæmoptysis, only 13, which occurred among the enormous number of visitors. We have already re-

Respiratory and circulatory diseases.

Bureau of Medical Service.

marked that the large number of cases of digestive disorders, 3199, were nearly all attributable to excesses or indiscretions in eating or drinking, with the exception of cases of a chronic character.

Absence of intoxication.

In illustration of the class of persons who visited the Exhibition, it is to be observed that but 10 cases of intoxication were brought to the hospital for treatment. It was anticipated that a considerable number of cases of abortion or miscarriage would occur in consequence of the excessive exertions and fatigue incurred by many visitors to the Exhibition. In but one case, however, did abortion result; and in one other miscarriage was threatened, but was averted by rest and the use of opium.

Deaths within the grounds.

There were but 4 deaths within the grounds during the entire period of the Exhibition. Of these, 2 occurred from organic disease of the heart and 2 from apoplexy.

Surgical cases.

The surgical cases, 944 in number, were for the most part of minor severity. It is a striking illustration of the good order which prevailed among the vast crowds which daily assembled in the grounds that there was not a single case of injury resulting from personal violence. This was especially remarkable on those days when some particular attraction drew unusually large numbers of visitors. Yet even on "Pennsylvania day," when over a quarter of a million persons were gathered within the grounds, most of whom remained until long after nightfall, so perfect was the good temper of the crowd, so entirely capable were they of taking care of themselves, and so careful to respect each other, that, although no special precautions were taken and no additional constabulary was employed, the occasion was entirely unmarked by any unusual accident. No quarrel occurred, and no woman or child was crushed or trampled upon. The passenger railway which traversed the grounds carried 68,273 persons on that day; and, although the crowded trains frequently seemed to literally plow their way through the dense masses which lined the tracks, there was not a single accident. It may be questioned whether any festival, equally remarkable in all respects, has ever occurred. It is also noteworthy, when the enormous amount of machinery in motion, and the throngs of curious visitors constantly surrounding each machine are considered, that not a single accident happened, with the exception of a few trifling contusions and lacerations occurring among the workmen. There were 3,784,142 passengers in all carried by the Narrow-Gauge Railway Company, without the occurrence of any accidents.

Remarkable absence of accidents.

For the entire period of the Exhibition the ratio of cases of sickness among the visitors was 1 in every 1533. The greatest number of patients treated in one day was 114, on September 28, "Pennsy-

vania Day," when there were 274,919 visitors, thus giving 1 patient in every 2411; while on the 20th of July there were only 25,936 visitors, and 58 cases of sickness, or 1 in every 447, the highest percentage occurring during the Exhibition. Bureau of Medical Service.

The following table shows the number of patients treated at the Hospital, and the proportion borne to the total number of visitors on the days when the attendance at the Exhibition was greatest. The mean temperature has also been placed in connection with the other data:

TABLE V.

Amount of sickness in proportion to number of visitors.

	Number of Visitors to the Exhibition.	Number of Patients treated at the Hospital.	Ratio.	Mean Temperature, Fah.
May 10, Opening Day	186,672	5	1 in 37,334	56.7
July 4	56,494½	48	1 in 1,177	82.5
August 24, New Jersey Day	67,052	60	1 in 1,117	73.7
September 7, Connecticut Day	75,044	59	1 in 1,272	63.0
September 14, Massachusetts Day	97,868	80	1 in 1,222	68.2
September 21, New York Day	134,588	60	1 in 2,243	61.7
September 28, Pennsylvania Day	274,919	114	1 in 2,411	56.2
October 5, Rhode Island Day	100,946	48	1 in 2,103	58.5
October 12, New Hampshire Day	115,422	53	1 in 2,177	45.0
October 19, Delaware and Maryland Day	176,407	71	1 in 2,484	53.7
October 26, Ohio Day	135,661	73	1 in 1,852	45.5
October 27, Vermont Day	108,080	53	1 in 2,039	43.7
November 10, Closing Day	121,721	31	1 in 3,926	39.7

The opening day may be disregarded in this respect for the reasons already given. With reference to the other days, it will be observed that so long as the average temperature was moderate, say between 40° and 60°, the sickness among the visitors was apparently not influenced by it, but varied within certain limits from other causes. When, however, the average temperature was materially above 60°, it was found that the proportion of sickness increased considerably. As the temperature was the chief agent in influencing public health during the Exhibition, it will be interesting to subject it to a more careful study. In order to facilitate this, Charts Nos. 1 and 2 have been prepared. The first feature which is apparent from these is the excessive temperature that prevailed during the thirteen weeks of June, July, and August. During this entire period the average weekly temperature was continuously above 70°, and during the four weeks ending July 22, the average weekly temperature was 81¾° Fah. The effects of this protracted heat were aggravated by the dry character of the season. The influence of the elevated temperature upon the amount

Influence of high temperature.

Bureau of Medical Service.

and character of mortality in the city at large is very apparent, and will be carefully discussed later on. We would now ask attention to its influence upon the admissions to the Exhibition and upon the amount of sickness among the visitors. It will be seen that during the first 5 weeks of the Exhibition, up to June 10, there was a steady increase in the total weekly admissions to the grounds, so that for the week ending with the above date they numbered 233,406. At this time it was confidently expected that, as the traveling season was about to begin, there would be a rapid rise in the attendance. Unfortunately, however, the heated term, which was destined to be so long and so intense, began at that date. In consequence, undoubtedly, of the reports concerning the heat which were quickly circulated, the attendance, instead of increasing, immediately showed a falling off. In the week ending July 1 the number had fallen to 210,108; average weekly temperature, 81°. The total for the week ensuing, average temperature being 80°, was brought up to 315,853 by the large number of visitors attracted by the ceremonies of the 4th of July; but in the following week, with an average temperature of 83°, the total fell to 174,792½; and in the week after, with an average temperature of 80°, it continued to fall, and reached the number 166,744. At this point a break in the continued heat occurred, and the attendance instantly began to rise, but it was not until the 15th week of the Exhibition that the number of visitors had attained the point where it stood in the 5th week. From this point the attendance rapidly rose, and was no longer influenced by the temperature, which continued moderate until the close of the Exhibition. The irregularities in the curve showing admissions (represented by the dotted black line) were chiefly, if not entirely, dependent upon the occurrence of certain days of particular interest. While undoubtedly the total admissions to the Exhibition were seriously diminished in consequence of the extreme heat which raged during the month of July and parts of June and August, it is a matter of congratulation that large numbers of strangers did not visit Philadelphia during that time. It would have been impossible for the vast throngs which crowded the grounds during the latter part of the season to have visited them during the heated term without a lamentable amount of sickness resulting. The effects of the heat upon the general attendance at the Hospital are clearly shown by following the dotted red line in Chart No. 2. The fact that after the marked fall in this attendance which followed the break in the heated term the number of cases again began to increase in the 15th week, and continued quite large during the rest of the season, was entirely due

Influence of high temperature on admissions and on amount of sickness.

to the great and progressive increase in the general admissions to the grounds, which began at that date. Although this effect is shown in the general attendance at the Hospital, it is far more clearly displayed in regard to diarrhœal affections (see dotted yellow line in Chart No. 3) and the class of cases showing exhaustion in its various forms. (See dotted yellow line in Chart No. 2.) Bureau of Medical Service.

We invite attention, in the next place, to the sanitary statistics of the city of Philadelphia at large during the period of the Exhibition. In endeavoring to estimate the effect produced upon the health of the community by the sudden introduction of vast numbers of unacclimated strangers, it is necessary to bear in mind the peculiarities of the season and the very great differences which occur, without appreciable cause, in the mortality from some of the principal diseases in different years. Sanitary statistics of Philadelphia

It is also highly important to determine as closely as possible the movement of the population of the city during this period. It is needless to say that, for the following reasons, this can be done with only approximative accuracy. In the first place, the floating portion of the population was directly absorbed into and blended with the resident population in a most remarkable manner. In other cities, when an occasion draws a large concourse of visitors, the additional numbers are accommodated chiefly in hotels and boarding-houses. Of course a considerable number would also be received as guests into private families, but these would form but a very small proportion of the whole. On the other hand, although the hotel accommodation in Philadelphia was very largely increased in anticipation of the Exhibition, and although many additional boarding-houses were opened, the great bulk of the floating population was quartered in private houses. This was partly the result of the operations of the Centennial Boarding-House Agency, which enabled all housekeepers, who so desired, to receive as many lodgers as they could accommodate; but it was chiefly due to a system of hospitality so lavish and so universal that it has probably never before been equaled. The almost unlimited extent to which this reception of guests and lodgers was carried can only be understood by recalling the fact that Philadelphia, with a population estimated in the early part of 1876 at 817,488, contained, in addition to other kinds of buildings, over 143,000 houses occupied by families, thus giving an average of less than six persons to each residence. The second source of difficulty in estimating the total population of the city lay in the frequent and extreme fluctuations which occurred in it. In the following statements, the ordinary floating population necessarily incident to the daily life of a great Estimated population of city during Exhibition period.

Bureau of Medical Service.

city is of course excluded. Bearing in mind the result of the census above given, it may be safely estimated that from May 10 to June 25, the beginning of the period of intense heat, the daily number of strangers in the city was from 30,000 to 50,000. From June 25 to August 10 the number must have fallen off considerably, and probably ranged from 15,000 to 25,000 per diem. After August 1 the number steadily and rapidly increased, so that during the last three months of the Exhibition it ranged from 50,000 to 200,000. It will be seen later that these fluctuations in the population bear an interesting relation to the variation in the amount of certain diseases. In order to serve as a basis of calculation it is necessary to decide upon a figure as representing the average population during the entire Exhibition period. After much reflection it appears proper to adopt the figure 900,000 as being unquestionably a safe and rather low estimate, and we shall accordingly use this as our basis in computing and comparing all ratios of sickness, mortality, etc. There are, however, two sources of difficulty met with in attempting to give any definite idea of the health of Philadelphia during this particular period. The first of these is incidental to all such calculations, and depends upon the fact that the records of the Board of Health give only the number of cases of death from various causes, and that no means exist for obtaining the actual number of cases of such sickness which have occurred. In regard to dangerous affections, where the rate of mortality is considerable and more or less definite, it is possible to make an approximative calculation of the total number of cases which have occurred, based upon the number of deaths. But in the case of comparatively non-fatal affections, it is obviously impossible to apply any such rule. The other source of difficulty lies in the fact that much of the sickness which occurred was among visitors, who in many instances, as soon as attacked, returned to their homes. It is of course impossible to estimate what amount of mortality may have thus occurred in different parts of the country from sickness actually contracted in Philadelphia. So much discussion of this question has taken place in many quarters, both at the time and since the close of the Exhibition, and so many statements were made which we are compelled to regard as greatly exaggerated, that it seems necessary to consider it somewhat in detail. It cannot be doubted that, owing to the unusually severe character of the season, and perhaps to peculiar atmospheric conditions which we cannot appreciate, there existed a strong tendency to diarrhœal and typhoid affections over a large section of the country. During the six months with which we are chiefly concerned the above diseases are the only

Fluctuations in number of strangers in city.

Sources of difficulty in estimating health of city.

Sickness among visitors to Exhibition after their return home.

ones which caused any considerable amount of mortality, and we shall therefore devote particular care to their consideration. In speaking of the sickness among the visitors to the Exhibition, we have already alluded to the numerous causes which predisposed them to diarrhœal and febrile affections. We beg here to refer to what was said at that point (see pages 654–5), because we are convinced, from careful observation and reflection, that there existed no special conditions in the city, either at the Exhibition grounds or elsewhere, whether in the form of imperfect drainage, impure drinking-water, or any other special local feature, which were calculated to induce sickness. We have endeavored to show that, on the contrary, the great proportion of sickness which did occur among the visitors to the Exhibition was dependent upon the circumstances of their visit, such as long and hurried journeys, excessive fatigue while at the grounds, indiscretions in eating and drinking, etc.

Bureau of Medical Service.

Sickness dependent on circumstances under which Exhibition was visited.

Not only indeed did large numbers of persons arrive in the city thus predisposed to contract sickness from any cause, but we became acquainted with the fact that in many cases sickness was actually contracted and had even developed itself before their arrival here. It is of course impossible to estimate the number of such cases, but from our personal knowledge of several deaths and of not a few cases of serious sickness, occurring in this manner, we infer that the total must have been large. Indeed, when we consider the full force of these influences, and the vast numbers upon whom they operated, it appears remarkable that the mortality statistics were not more seriously affected than they were. Thus, we find that out of 10,294 deaths in Philadelphia from all causes during the six months from May 10 to November 10, only 1333, or 11.8 per cent., were from diarrhœal affections. Of this number no less than 1232 deaths occurred among children under 5 years of age, leaving only 101 deaths from all diarrhœal affections during the entire Exhibition period among adults and children above 5 years of age.

In comparing this with the mortality from the same causes during the corresponding period of previous years, it is found that it is even below the average. Thus, while during the hot months of 1876, from May to November inclusive, the mortality from diarrhœal affections among children under 5 years of age was 1.38 per 1000 of the total living population, during the 7 years from 1862 to 1868 inclusive the rate was 1.78 per 1000. In regard to diarrhœal affections occurring among adults, the record of 1876 shows no less favorable results in comparison with previous years. To show how entirely these diseases were under the influence of high temperature, we refer to Chart

No excessive amount of diarrhœa in the city.

Bureau of Medical Service.

Marked influence of heat on mortality from diarrhœa.

No. 3. By following the yellow line it will be seen that, after the temperature had continued above 70° for a short time, the mortality from diarrhœal affections began to increase; and that, from the close of June, when the mean weekly temperature reached 80°, it continued to increase with frightful rapidity for 3 weeks, when a decrease in temperature was accompanied by a fall in the mortality; and finally that, during the last week of July and the first week of August, when the mean temperature was 71° and 70°, this fall continued at a rapid rate. A rise in weekly temperature to 78° and 76°, during the middle of August, was accompanied with a moderate rise in the mortality from diarrhœal affections, quickly followed, however, by a still more decided and persistent fall, so that after the first of September the number of deaths from that cause was comparatively small. It has already been shown that scarcely any part of this mortality was connected with the influx of visitors to the city; and this is further proved by the fact that from the very time, September 1, when the mortality rapidly and finally fell, the attendance at the Exhibition grounds rapidly and steadily rose. The number of cases of diarrhœal affections treated at the Medical Department, and due exclusively to such causes as indiscretions in eating and drinking, followed with considerable closeness the fluctuations in the weekly attendance at the Exhibition. As corroborating the truth of what has more than once been stated with regard to the sanitary advantages of Philadelphia we ask attention to the following table, which shows the relative mortality from diarrhœal affections during 1876 in Philadelphia and some other large American cities:

Mortality from diarrhœa in large cities.

1876.	Philadelphia.	New York.	Brooklyn.	Baltimore.	Chicago.
Population	825,594	1,054,000	506,233	355,000	420,000
Mortality from diarrhœal affections.	1,417	3,782	1,542	866	954
Death-rate from diarrhœal affections per 1000 living	1.66	3.50	3.04	2.44	2.28

Mortality from typhoid fever.

Next to diarrhœal affections, which caused a mortality of 1333 out of 2485 deaths from all zymotic diseases during the Exhibition period, typhoid fever was more fatal than any other disease of this class. No less than 450 deaths are recorded as having occurred during the six months from this affection; and taking the entire year 1876, the total number of deaths from this cause was 761.

We have already expressed our belief that in a not inconsiderable portion of these cases, inflammatory diarrhœas of a typhoid type were reported as cases of true typhoid fever. But this does not in-

terfere with the fact that during the entire year 1876 there was a much larger amount of typhoid fever in this city than is usual. In order to clearly show this it is only necessary to give the following table of the annual mortality from typhoid fever for the past 16 years, with the annual death-rate per 1000 living: Bureau of Medical Service.

Year	1861	1862	1863	1864	1865	1866	1867	1868	1869	1870	1871	1872	1873	1874	1875	1876
Population in thousands	565	565	565	565	565	674	674	674	674	674	674	725	750	775	800	825
Total mortality from typhoid fever	281	654	486	648	773	381	367	395	373	409	313	369	382	472	420	760
Annual death-rate per 1000 living	.49	1.15	.85	1.14	1.36	.56	.54	.58	.55	.60	.47	.50	.50	.60	.52	.91

Excessive mortality from typhoid fever in 1876.

During the Exhibition period the population may be estimated at 900,000, and this, with a mortality during those six months of 450 from typhoid fever, gives a rate of annual mortality from this cause of 1 per 1000. It will be seen, on examining this table, that the annual death-rate per 1000 from typhoid fever during last year was exceeded during the years 1862, 1864, and 1865, while it was very closely approached in 1863. In considering the causes which led to the high rate of mortality from this disease during the latter years, it will be found that it was connected with the large number of soldiers who were quartered in and around the city. So, too, in considering the sudden increase in typhoid fever that occurred during the year 1876, the most important cause which suggests itself is the enormous influx of unacclimated visitors during the Exhibition period. It has long been known, in connection with typhoid fever, that none are so likely to be attacked as the residents of small towns or rural districts, when visiting large cities to whose climate and conditions of life they are unaccustomed. This is undoubtedly because such persons are much more susceptible than the permanent residents to the causes of typhoid fever, even though existing only in the moderate degree which is too often found in large cities. The truth of this may be realized from the fact that during the Exhibition period in 1876 the number of deaths from typhoid fever was 450, as contrasted with 207 deaths from this cause during the corresponding period of 1875.

This excess due to influx of unacclimated visitors.

That this increase was due to the vast influx of unacclimated visitors, and not to any special prevalence of the causes of typhoid fever during that period, may be inferred from the fact that in those hospitals which received almost exclusively patients from among the poorer classes resident in the city, the number of cases of typhoid and typho-malarial fevers treated between May 1 and November 15, 1875, was 49, while during the corresponding months of 1876 the number was only

Cases of fever treated at hospitals.

Bureau of Medical Service.

28. On the other hand, in those hospitals which receive patients chiefly of a better class, and to which, consequently, strangers who may be taken sick while on a visit to the city are frequently admitted, the number of cases of typhoid and typho-malarial fevers treated during the Exhibition period of 1876 was about double that treated during the corresponding period of 1875.

Ratio of deaths from typhoid fever to number of visitors.

Still more convincing evidence in favor of this view is to be found in an examination of the relation borne by the number of deaths from typhoid fever to the number of visitors to the Exhibition grounds. (See Chart No. 4.) It will be seen by the course of the solid blue line, indicating the mortality from typhoid fever, that there was no marked increase beyond the ordinary mortality from this affection from May 1 to the last week of July, during which time the number of visitors in attendance at the Exhibition was low, as is shown by following the dotted black line which indicates the weekly attendance. (See also tabulated statement at foot of page.)

During this time, also, the number of strangers arriving in the city was especially small, the attendance at the Exhibition being chiefly of

Table showing ratio of mortality from typhoid fever to admissions and attendance at Hospital.

Week ending		Mortality from Typhoid Fever in Philadelphia	Admission of Visitors to the Exhibition.	Attendance at the Centennial Hospital.
May	13	7	235,251½	14
"	20	10	115,236	19
"	27	12	155,724	51
June	3	10	204,704½	62
"	10	10	233,406	69
"	17	12	216,536	117
"	24	12	232,535	159
July	1	10	210,108	204
"	8	9	315,853	301
"	15	10	174,792½	301
"	22	13	166,744	252
"	29	18	185,464½	259
August	5	22	196,277	205
"	12	23	210,075	282
"	19	26	241,078	276
"	26	31	347,082	334
September	2	29	321,997	348
"	9	24	446,032	347
"	16	12	495,694	359
"	23	31	624,372	359
"	30	15	758,160	349
October	7	29	551,669	398
"	14	21	584,011	307
"	21	10	700,600	322
"	28	13	641,021	336
November	4	15	628,348	322
"	10	16	596,102	211

the residents of Philadelphia. The large number of visitors attracted to the city by the ceremonies of the 4th of July, remained for so brief a time that they exerted no influence upon the mortality from this cause. After the week ending July 29, a steady rise in the weekly attendance occurred, which continued to progressively increase, with occasional fluctuations due to special causes, until the close of the Exhibition. With this there was noticed a rise in the weekly mortality from typhoid fever, which continued until the weeks ending August 26 and September 2, when, with a weekly attendance of 347,082 and 321,997 respectively, the mortality from typhoid fever was 31 and 29. After the latter date, although there is a still further marked increase in the weekly attendance at the grounds, the deaths from fever never exceeded the figures above given; but, on the contrary, after October 10 there was a very marked reduction in the weekly mortality from this cause. The marked effect of the intense heat upon the mortality from diarrhœal affections, not only in Philadelphia but elsewhere, has already been shown (see pages 21, 22); and it is interesting to observe that no similar effect was produced upon the mortality from febrile diseases.

Bureau of Medical Service.

Ratio of mortality from typhoid fever and admissions.

The amount of typhoid fever in neighboring cities during the Exhibition period was not more than usual during the corresponding months of other years, and this fact is interesting when we bear in mind the statements which were widely circulated at the time, that very numerous cases of typhoid fever occurred among persons who had returned home from their visit to the Exhibition. It is difficult to conceive how this could have been so to any extent without influencing perceptibly the mortality from the febrile affections during that period. It may therefore be stated, in conclusion, that during the six months of 1876, from May 10 to November 10, there occurred in Philadelphia an unusual number of deaths from typhoid fever; that this excess over the usual mortality amounted to about 200 deaths; that the occurrence of this unusual mortality from typhoid fever was not due to the existence of any special cause of that disease in connection with the Exhibition, or to the prevalence in an unusual degree throughout the city at large of its ordinary causes; but that it was due to the enormous influx of unacclimated visitors, who were rendered additionally liable to the action of morbid influences of every kind by their mode of life while in this city.

No excess of mortality from typhoid fever in other cities

Conclusions as to prevalence of typhoid fever

Having thus spoken of the statistics of typhoid fever during 1876, both in this city and elsewhere, a few words only upon its character are called for in this report. It will have been observed that the terms typhoid and typho-malarial fever have been used. The first of

Definition of typhoid and typho-malarial fever.

Bureau of Medical Service.

Definition of terms.

these is employed, as is well known, to designate a specific febrile affection, characterized by a peculiar form of ulceration of the intestines, and caused, so far as is yet known, by the emanations from decomposing animal matter, and especially by those from the evacuations of patients having this same disease. The term typho-malarial fever has been introduced of late years to designate a disease in which it is believed the specific poison of typhoid fever exists, complicated with malarial poison. Medical opinion is still somewhat divided with regard to the latter affection, although it is generally acknowledged that such a disease, due to the combined action of the two poisons, does actually exist. It seems probable, however, that the term typho-malarial fever has often been used inaccurately, so as to include cases of irregular typhoid fever, and probably also cases of simple intestinal catarrh with marked typhoid prostration and irregular febrile action.

Characters of typhoid fever of 1876.

We believe that the typhoid fever which occurred during 1876 was not much modified, at least here and in neighboring localities, by the admixture of a malarial element. This opinion is based not only on the characters of the disease as it came under our notice, but also on the small amount of malarial fever of any form which occurred here during that season. It is true that, in a considerable number of instances, the cases were termed typho-malarial fever in the returns to the Board of Health, but we are convinced that the large majority of such cases were either uncomplicated typhoid fever of irregular or abortive type, or else catarrhal diarrhœa with marked typhoid prostration of system. Indeed, we have more than once expressed our belief that a considerable proportion of the deaths recorded as from typhoid fever were in reality due to this latter condition. The typhoid fever itself was very irregular. In many cases it ran a much shorter course than in the usual typical form, not exceeding 15 to 18 days. Another marked peculiarity was the frequent occurrence of hemorrhage from the bowels, which took place in a larger proportion of cases than usual.

Ratio of mortality.

It is, of course, difficult to estimate the ratio of mortality of a disease occurring under such circumstances, but from the data in our possession it may be stated as about 18 per cent. As an illustration of the extent to which typhoid fever is influenced both in its degree of prevalence as well as in its mortality by epidemic causes, which it is difficult to appreciate, it may be stated that in Paris (where the mortality during the previous three years was as follows: in 1873, 1007; in 1874, 846; in 1875, 1001) the number of deaths from this disease during the year 1876 amounted to 2073, and so severe was the type

that the rate of mortality rose as high as 35 per cent. of all cases treated. Bureau of Medical Service.

We have entered thus at length into the discussion of the typhoid fever of 1876 on account of the large amount of public interest which this disease attracted during the Exhibition period. In summing up our remarks upon the sanitary condition of Philadelphia during this interesting time, it will be seen that the general results do not differ materially from those stated in our circular issued in the latter part of September. (See Exhibit A, Circular No. 3.) Circular No 3, issued in September.

At that time the data in our possession did not enable us to distinguish between the different classes of diseases with as much accuracy as we have done in the following table, which embraces the entire Exhibition period:

Results brought up to close of Exhibition.

	Population in Thousands.	Total Mortality from all Causes.	Annual Death-Rate per 1000 Living.	Total Mortality from all Zymotic Diseases.*	Annual Death-Rate per 1000 from Zymotic Diseases.	Total Mortality from Typhoid Fever.	Annual Death-Rate per 1000 from Typhoid Fever.	Total Mortality from Diarrhœal Affections.	Annual Death-Rate per 1000 from Diarrhœal Affections.
London	3489	37,592	21.54	6905	3.99	606	.34	3149	1.80
Philadelphia	900	10,294	22.77	2485	5.5	450	1	1333	2.96
Baltimore	350	4,020	22.97	1524	9.2	148	.84	652	3.72
Chicago	420	4,927	23.46	2277	10.8	108	.51	918	4 37
Boston	342	4,144	24.33	1422	8.3	98	.56	772	4.5
Brooklyn	506	6,453	25.49	2583	10	53	.20	1485	5.86
Paris	1851	23,735	25.63	.....	.....	1122	1.21	.....	.....
New York	1054	15,492	29.40	5884	11	168	.30	3527	6.69
Berlin	980	16,407	33.86	.....	.....	393	.81	.....	.....

It will be seen from this that of the nine large cities from which we have been able to secure returns, Philadelphia was second to London alone in point of average total mortality. It will also be seen that while the annual death-rate from typhoid fever per 1000 living in Philadelphia was higher than in any other of these cities excepting Paris, the annual death-rate per 1000 from all zymotic diseases, which include diarrhœal affections, continued and eruptive fevers, etc., was relatively smaller in this city than in any other save London. This result is chiefly due to the relatively small mortality from diarrhœal affections, which gave an annual death-rate per 1000 of only 2.96, as contrasted with 6.69 in New York, or 5.86 in Brooklyn. Favorable sanitary position of Philadelphia.

If we have been correct in our conclusions previously stated (see pages 14, 25), it may therefore be confidently asserted that Phila-

* By zymotic diseases are to be understood all diarrhœal affections; eruptive fevers, such as smallpox, measles, scarlatina, etc.; typhoid and malarial fevers; diphtheria, etc.

Bureau of Medical Service.

delphia has again vindicated her claim to be regarded as the most healthy city in the world, with a population of over 500,000, with the single exception of London.

Some of the causes of this are stated in the circulars alluded to (see Exhibit A), and it is owing to the nature of these causes that the unprecedented risks of a sanitary nature connected with so vast an influx of strangers to the city were met with such signal success.

Acknowledgment.

It is proper to state that in the establishment of the Hospital a full supply of medicines was presented, with great liberality, by the following well-known firms: Messrs. Powers & Weightman, Rosengarten & Sons, Hance, Brothers, & White, and Bullock & Crenshaw, all of Philadelphia.

BUREAU OF MEDICAL SERVICE.—EXHIBIT A.

OFFICIAL CIRCULARS.

UNITED STATES CENTENNIAL COMMISSION.

INTERNATIONAL EXHIBITION, 1876,

PHILADELPHIA.

Bureau of Medical Service.

BUREAU OF MEDICAL SERVICE.

CIRCULAR NO. I.

Owing to the very large number of persons who contemplate a visit to Philadelphia during the coming summer, it seems important that the utmost publicity should be given to all facts bearing on the sanitary condition of the city. Circular No 1

The following statistics, which have been obtained from the most authentic sources accessible, represent the mortality in some of the chief cities of the world during the past four or five years:

	Number of Years.	Average Population.	Average Total Mortality.	Average Death-Rate per 1000.
Vienna	5	648,560	20,424	31.42
New York	5	994,458	29,601	29.93
Berlin	4	950,000	28,420	29.91
London	5	3,284,488	76,741	23.33
Paris	4	1,851,792	42,724	23.06
Philadelphia	5	744,831	16,573	22.27

While thus showing an average rate of mortality more favorable than that found in any other city containing over 500,000 inhabitants, Philadelphia has recently (1874) attained a degree of healthfulness almost unparalleled, viz.: with a population at that time of 775,000, the number of deaths was but 14,966, giving a death-rate of only 19.3 per thousand. These very favorable results are largely due to the abundant and cheap water supply, and to the opportunities given, even to the poorest citizen, for the enjoyment of pure country air in the great Fairmount Park, which contains 2991 acres. The extent to which this is valued by the citizens may be inferred from the fact that during the year 1875 the Park was visited by over eleven million persons.

The most powerful influence of all, however, is the absence of that overcrowding of the population, which is the most fruitful source of sickness and death in many quarters of nearly all other large cities. This will be more clearly comprehended when it is remembered that the 817,488 inhabitants of Philadelphia are spread over an area of 129⅛ square miles, which are traversed by more than one thousand miles of streets and roads; and that the city contains, in addition to other kinds of buildings, 143,000 dwelling-houses occupied by families,—a number exceeding by over 40,000 that of any other city in America.

The climate of Philadelphia is also, on the whole, a favorable one, although presenting many of the peculiarities common to inland localities. The mean annual temperature of the last ten years is 53.73° Fahrenheit; the average annual rain-fall is about forty-five inches.

Bureau of Medical Service. Circular No. 1.

The following table exhibits the mean temperature of each month for the past ten years, showing that the range is far less extreme than is found in many other less favorably-situated localities:

MEAN TEMPERATURE (FAHRENHEIT) OF EACH MONTH DURING THE PAST TEN YEARS.

January	32.72° F.	July	78.74° F.
February	33.12 "	August	75.92 "
March	39.16 "	September	67.72 "
April	53.36 "	October	56.03 "
May	63.24 "	November	43.34 "
June	73.54 "	December	33.92 "

It is thus seen that only during the months of June, July, and August does the mean temperature rise to a high point. During this period there are very rarely any prevailing epidemic diseases; and the chief mortality occurs among children, especially among the poorer classes.

The health of Philadelphia at present is unusually good. Timely efforts have been made to secure an abundant water supply to meet the great increase in the demand which must be expected this summer, as compared with previous years. Constant watchfulness will be exercised by the authorities to maintain cleanliness, and to avoid or remove every possible cause of disease.

Within the Exhibition grounds a rigid sanitary inspection will be maintained, under the control of the Bureau of Medical Service; and thus a guarantee will be afforded that no cause of infection or disease will be allowed to occur through neglect of this important duty.

The object of this circular has been to call attention to the unusual sanitary advantages of Philadelphia, and to the preparations which have been made to insure the highest possible degree of healthfulness during the approaching Exhibition season. It is proposed to issue at certain intervals other circulars, announcing in an official and accurate manner the sanitary condition of the city, so that entire security may be felt by all who desire to visit the Centennial International Exhibition.

WILLIAM PEPPER, M.D., *Medical Director.*

15th April, 1876.

CIRCULAR NO. 2.

Circular No. 2.

[POSTER USED IN THE BUILDINGS AND GROUNDS.]

THE BUREAU OF MEDICAL SERVICE

has been organized for the purpose of rendering immediate gratuitous aid in all cases of sudden illness or injury occurring to visitors and others within the Exhibition grounds.

The Medical Director has secured the services of a staff of six well-known and able physicians, who will be on duty from 9 A.M. to 6 P.M., at the Hospital building, which is centrally situated in Landsdowne Ravine, in the rear of the Judges' Hall, and is comfortably and suitably arranged for temporary relief and comfort of all in need.

In connection with the Hospital service, stretchers are placed at many points, by which such cases may be immediately carried to the Hospital, and an ambulance by which, when necessary, they can be removed to their residences. Any person needing medical aid may apply to the Guard, who are instructed to assist them to the Hospital without delay.

The Hospital may be recognized by its flags, one being the United States flag, having the words Centennial Medical Department printed across the centre; the other, a white flag, with a large red Geneva cross in the centre. The officers will be recognized by the badge, a white shield, with red Geneva cross, above which is a blue enameled bar, surmounted by the American eagle.

May 10, 1876.

WILLIAM PEPPER, M.D., *Medical Director.*

CIRCULAR NO. 3.

Bureau of Medical Service. Circular No. 3.

BUREAU OF MEDICAL SERVICE.

In a former circular issued from this Department, the exceptionally favorable position which is occupied by Philadelphia, in comparison with the other great cities of the world (*i.e.*, cities containing over 500,000 inhabitants), in regard to its sanitary advantages and average rate of mortality, was shown by carefully-prepared statistics. In anticipation of the unusually large number of visitors who would undoubtedly be present in the city during the continuance of the International Exhibition, great efforts were made by the municipal authorities, as well as by those in charge of the Exhibition grounds, to obviate every cause of disease. The details of these arrangements will be published in the official reports of the various departments, which will appear after the close of the Exhibition.

It is owing to their thoroughness that, despite the very severe and prolonged heat of June and July, and the vast number of unacclimated strangers constantly present in Philadelphia since the 10th of May, the general health of the city has been remarkably favorable. With the exception of the four weeks ending July 22, the range of temperature for the past five months has been about the average. Thus, for the entire period of twenty weeks since May 10, the mean daily temperature has been 71.30° Fah., while the average for the same months during the past ten years has been 71.82° Fah. The mean temperature of the four weeks referred to (ending July 22), on the other hand, was 80°, 83°, 83°, and 81° respectively, giving an average for the month of 81.75° against 75.5° Fah., the mean temperature of the corresponding period of the previous year.

The following table, showing the relative mortality of Philadelphia and some of the larger American and European cities, has been prepared with strict care from the official records. The periods selected for comparison correspond as closely as possible. It will be seen, on careful examination, that the past season has not been an unfavorable one :

CITIES.	Estimated Population.	Number of Weeks included, and Date.	Average Mortality per Week from Typhoid Fever and Diarrhœal Affections.	Average Mortality per Week from Zymotic Diseases.	Average Mortality per Week from all Causes.	Annual Death-Rate per 1000 during Week from Typhoid Fever and Diarrhœal Affections.	Annual Death-Rate per 1000 during Week from Zymotic Diseases.	Annual Death-Rate per 1000 during Week from all Causes.
London.....	3,254,260	26 weeks, including the quarters ending June 19 and Sept. 26, 1875.	105.5	291	1467.4	1.66	4.62	23.40
Philadelphia..	900,000	20 weeks, from week ending May 13 to week ending Sept. 23, 1876.	83.8	112	406.5	4.84	6.47	23.48
Chicago	420,000	18 weeks, from week ending May 13 to week ending Sept. 9. 1876.	52	80	196	6.44	9.9	24.27
Boston.....	342,000	18 weeks, from week ending May 13 to week ending Sept. 9, 1876.	36.7	57.4	161	5.56	8.73	24.48
Baltimore.....	360,000	19 weeks, from week ending May 13 to week ending Sept. 16, 1876.	48.9	58.1	172.36	6.91	8.37	24.80
Paris	1,851,792	26 weeks, including the quarters ending June 25 and Sept. 24, 1875.	64	.....	896	1.76	.....	25.16
Brooklyn.....	506,223	20 weeks, from week ending May 13 to week ending Sept. 23, 1876.	75.7	115	262	7.74	11.81	26.91
New York.....	1,064,236	19 weeks, from week ending May 13 to week ending Sept. 16, 1876.	174.9	262	629.7	8.52	12.79	30.73
Berlin.....	950,000	26 weeks, including the quarters ending June 30 and Sept. 30, 1873.	201	.....	626	10.92	.....	34.32

Bureau of Medical Service. Circular No. 3.

It will be further observed that, as in the table published in the former circular, Philadelphia occupies an exceptionally favorable position. With the exception of London, whose rate of mortality is nearly identical, Philadelphia presents a considerably lower rate than any other of the great cities, while in comparison with its nearest neighbors, New York and Brooklyn, its superiority is both striking and suggestive.

In calculating the rate of mortality in Philadelphia during the past twenty weeks, the population has been estimated at 900,000. Those who have carefully studied the movement of its population think, however, that in consequence of the large influx of visitors, this estimate is below rather than above the mean daily population. It must further be borne in mind that, while a considerable portion of its more favored classes were as usual absent from Philadelphia during the summer months, the lower classes, among whom the mortality is always greater at this season of the year, were largely reinforced. If in addition to this it is considered that a comparatively large amount of sickness might have been expected among the vast throngs of unacclimated visitors reaching the city after long and hurried journeys, and exposed to excitement and excessive fatigue, the full significance of the remarkable table above given will, it is hoped, be appreciated by all. As one of the most important factors in the maintenance of public health is the purity of the water supply, it is with great satisfaction that we learn from the official report furnished by Dr. Charles M. Cresson, the distinguished analytical chemist, that the purity of the water supplied from the Schuylkill River to the Exhibition grounds and the neighborhood is fully up to the standard of the past four years.

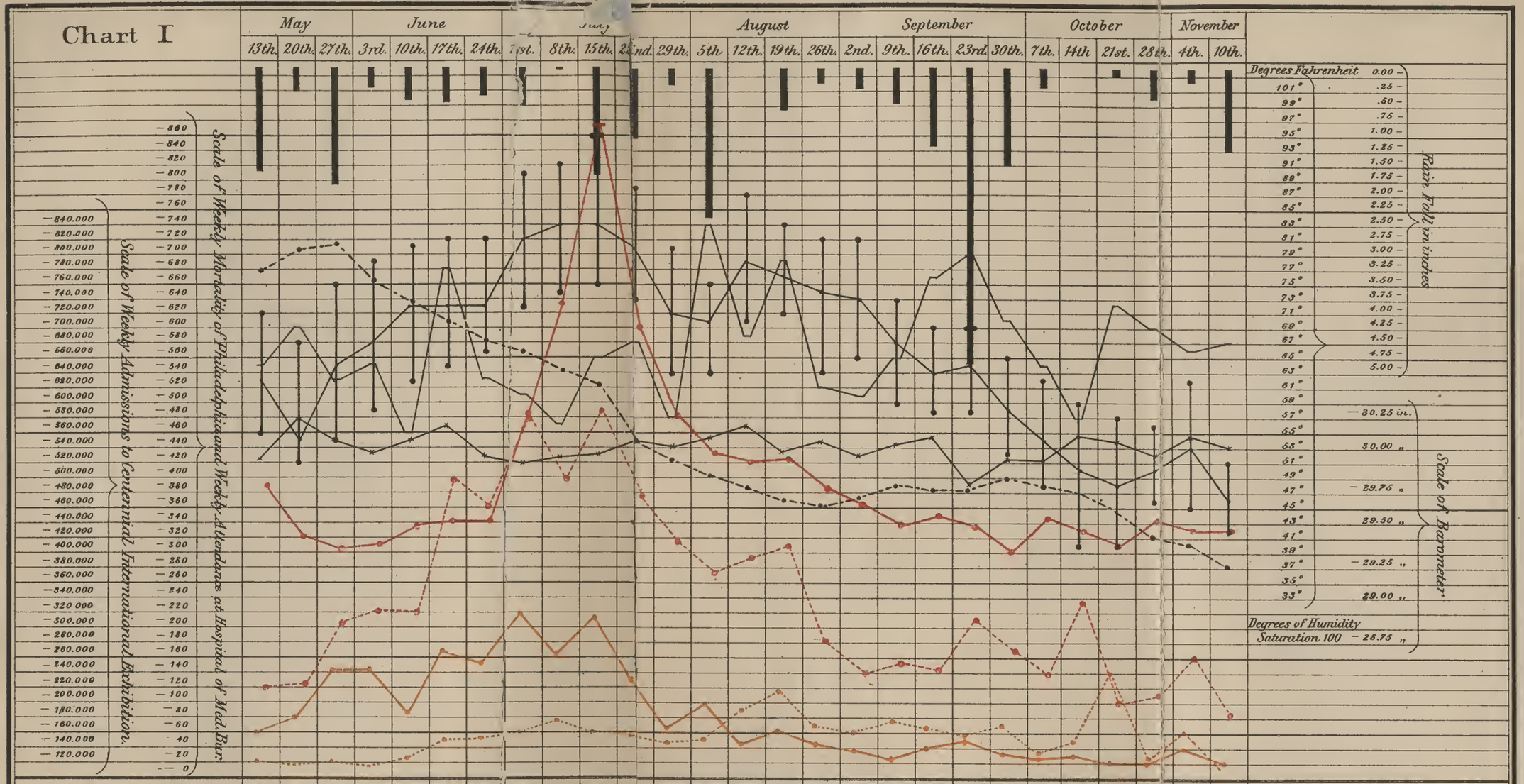
As the summer months, during which time alone any fears could be entertained for the development of widespread disease, have passed with such gratifying results, it is not premature to express the feeling of thankfulness and congratulation that during this important year Philadelphia has been favored with the same exceptionally low rate of mortality she has so long enjoyed.

WILLIAM PEPPER, M.D., *Medical Director*.

September 26, 1876.

Illustrating the Weekly Population Resident upon the Exhibition Grounds, the Number of Cases of Sickness, the Number of Cases of Diarrhœa, and the Number of Cases of Debility each Week among Residents upon the Exhibition Grounds, with the Weekly Mortality from all Causes in the City of Philadelphia and Meteorological Observations for the same Period furnished by the U.S. Signal Office

Chart I



	May			June				July					August				September					October				November	
	13th.	20th.	27th.	3rd.	10th.	17th.	24th.	1st.	8th.	15th.	22nd.	29th.	5th	12th.	19th.	26th.	2nd.	9th.	16th.	23rd.	30th.	7th.	14th	21st.	28th.	4th.	10th.
Total Weekly Rain Fall.	1.75in	.36in	1.97in	.35in	.52in	.55in	.48in	.63in	.03in	1.83in	1.16in	.25in	2.52in	.00in	.67in	.22in	.37in	.59in	1.31in	4.90in	1.60in	.30in	.00in	.15in	.61in	.22in	1.49in
Number of clear days.	1	3	4	3	5	1	5	5	4	2	3	2	0	2	2	2	1	2	1	0	2	5	4	4	1	5	2
Number of cloudy days.	6	4	3	4	2	6	2	2	3	5	4	5	7	5	5	5	6	5	6	7	5	2	3	3	6	2	5
Number of days with East wind.	1	3	1	2	1	2	0	0	1	3	4	1	6	4	5	3	0	3	5	5	2	1	1	3	4	3	4
Number of days with West wind.	6	4	6	5	6	3	7	7	6	4	3	6	1	3	2	4	7	4	2	2	5	6	6	4	3	4	2
Mean Thermometer Weekly.	62°	54°	64°	67°	72°	72°	72°	81°	83°	83°	80°	71°	70°	78°	76°	74°	73°	67°	63°	64°	58°	54°	50°	48°	50°	53°	46°
Mean Barometer Weekly.	29.93	30.20	30.04	29.97	30.04	30.14	29.94	29.90	29.94	29.96	30.05	30.01	30.08	30.14	29.96	30.04	29.96	30.02	30.07	29.77	29.93	29.91	30.03	30.04	29.5	30.07	30.01

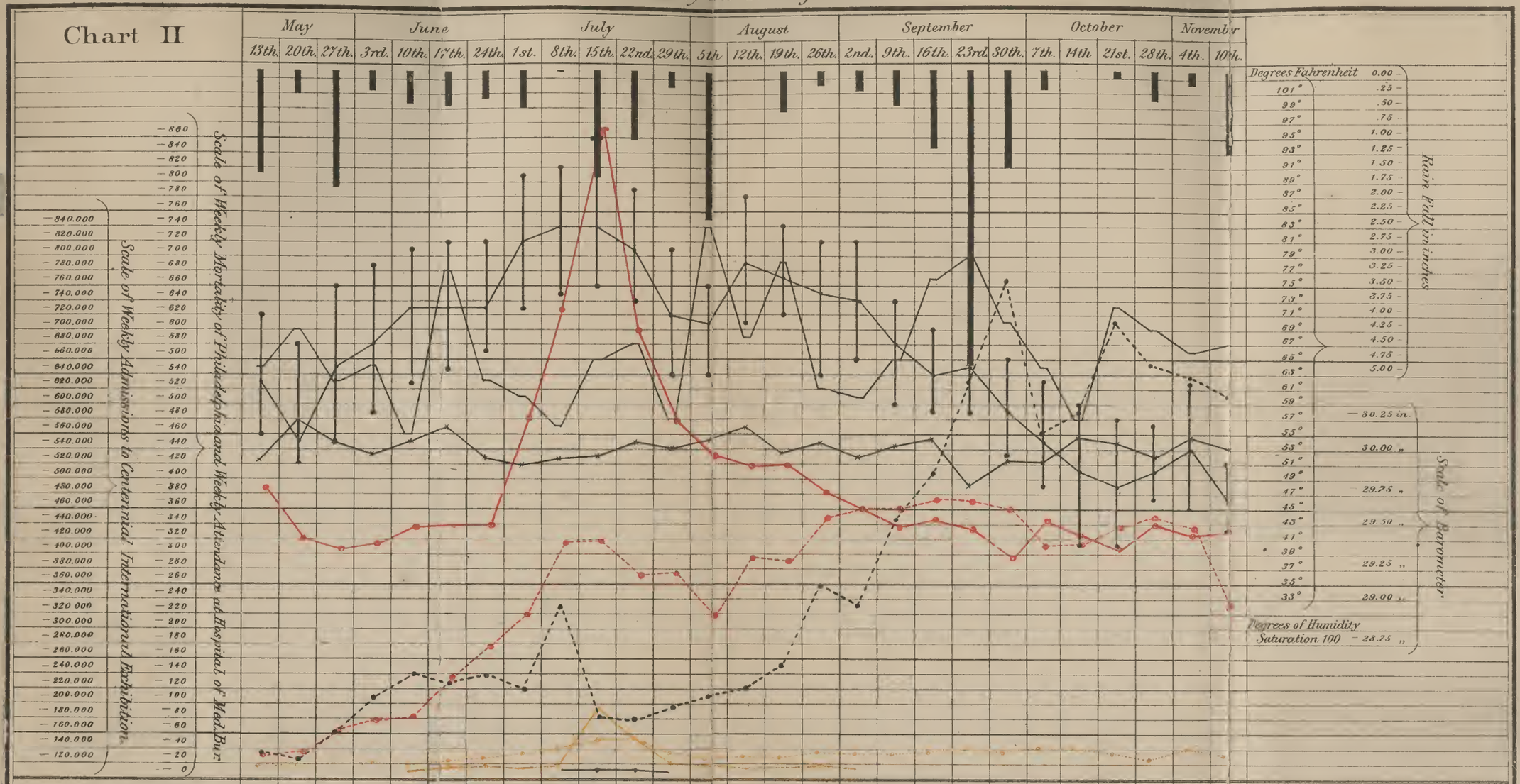
Weekly Mortality from all Causes in Philadelphia.
Weekly Number of Persons residing upon the Exhibition Grounds.
Weekly Cases of Sickness among Residents upon the Exhibition Grounds.
Weekly Cases of Diarrhœa among Residents upon the Exhibition Grounds.
Weekly Cases of Debility among Residents upon the Exhibition Grounds.
Weekly average Maximum and Minimum Temperature.
Mean Weekly Humidity.- Point of Saturation, 100.
Mean Weekly Thermometer.
Mean Weekly Reading of Barometer.
Weekly Rain Fall in inches.

January 1877.

THE GRAPHIC CO. N.Y.

Illustrating the Weekly Admissions to the Centennial International Exhibition, the Number of Patients treated at the Hospital of the Bureau of Medical Service, the Number of Patients treated for Exhaustion, and Effects of Heat, the Number of Patients treated for Sun Stroke, with the total Weekly Mortality from all Causes in the City of Philadelphia the Weekly Mortality from Sun-Stroke in Philadelphia and Meteorological Observations for the same Period, furnished by the U.S. Signal Office

Chart II



	May			June				July					August				September					October				November	
	13th.	20th.	27th.	3rd.	10th.	17th.	24th.	1st.	8th.	15th.	22nd.	29th.	5th	12th.	19th.	26th.	2nd.	9th.	16th.	23rd.	30th.	7th.	14th	21st.	28th.	4th.	10th.
Total Weekly Rain Fall.	1.75in	.36in	1.97in	.35in	.52in	.55in	.48in	.63in	.03in	1.83in	1.16in	.25in	2.52in	.00in	.67in	.22in	.37in	.59in	1.31in	4.90in	1.60in	.30in	.00in	.15in	.61in	.22in	1.49in
Number of clear days.	1	3	4	3	5	1	5	5	4	2	3	2	0	2	2	2	1	2	1	0	2	5	4	4	1	5	
Number of cloudy days.	1	4	1	1	2	6	2	2	3	5	1	5	7	5	5	5	6	5	6	7	5	2	3	5	6	2	
Number of days with East wind.	1	3	1	7	1	2	1	0	1	1	1	1	6	1	5	3	0	3	5	5	2	1	1	3	4	3	
Number of days with West wind.	6	4	6	5	6	3	7	7	6	4	3	6	1	3	2	4	7	4	2	2	5	6	6	4	3	4	
Mean Thermometer Weekly.	62°	54°	64°	67°	72°	72°	72°	81°	83°	83°	80°	71°	70°	78°	76°	74°	73°	67°	63°	64°	58°	54°	50°	48°	50°	53°	41°
Mean Barometer Weekly.	29.93	30.20	30.04	29.97	30.04	30.14	29.94	29.90	29.94	29.96	30.05	30.01	30.08	30.14	29.96	30.04	29.96	30.02	30.07	29.77	29.93	29.91	30.08	30.04	29.95	30.07	30.01

Weekly Mortality from all Causes in Philadelphia.

Weekly Mortality from Sunstroke in the City of Philadelphia.

Weekly Total of Attendance at Hospital at Exhibition Grounds.

Weekly Total of Cases affected by Heat and Exhaustion among Visitors treated at the Hosp.

Weekly Total Cases of Sunstroke among Visitors treated at the Hospital.

Weekly Admissions to the Centennial International Exhibition.

Weekly average Maximum and Minimum Temperature.

Mean Weekly Humidity.- Point of Saturation, 100.

Mean Weekly Thermometer.

Mean Weekly Reading of Barometer.

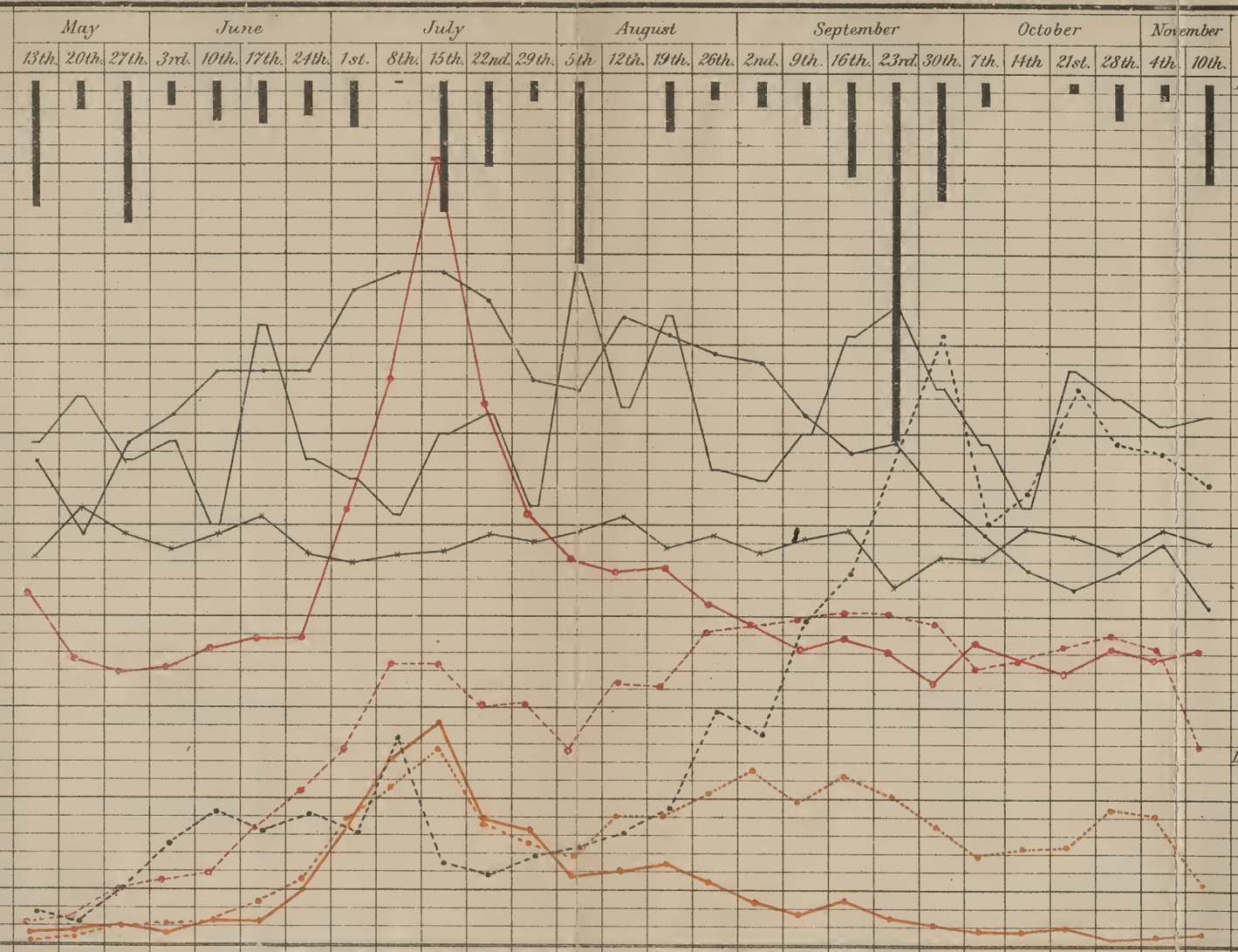
Weekly Rain Fall in inches

THE GRAPHIC CO. N.Y.

January 1877.

Illustrating the Weekly Admissions to the Centennial International Exhibition, the Number of Patients treated each week at the Hospital of the Bureau of Medical Service,- the Number of Patients treated for Diarrhœal Affections each Week, with the Weekly Mortality from all Causes in the City of Philadelphia, - the Weekly Mortality from Diarrhœal Deseases in Philadelphia and Meteorological Observations for the same Period furnished by the U.S. Signal Office.

Chart III



	May			June				July					August				September					October				November	
	13th.	20th.	27th.	3rd.	10th.	17th.	24th.	1st.	8th.	15th.	22nd.	29th.	5th	12th.	19th.	26th.	2nd.	9th.	16th.	23rd.	30th.	7th.	14th	21st.	28th.	4th.	10th.
Total Weekly Rain Fall.	1.75in	.36in	1.97in	.35in	.52in	.55in	.48in	.63in	.03in	1.83in	1.16in	.25in	2.52in	.00in	.67in	.22in	.37in	.59in	1.31in	4.90in	1.60in	.30in	.00in	.15in	.61in	.22in	1.49in
Number of clear days.	1	3	4	3	5	1	5	5	4	2	3	2	0	2	2	2	1	2	1	0	2	5	4	4	1	5	2
Number of cloudy days.	6	4	3	4	2	6	2	2	3	5	4	5	7	5	5	5	6	5	6	7	5	2	3	3	6	2	5
Number of days with East wind.	1	3	1	2	1	2	0	0	1	3	4	1	6	4	5	3	0	3	5	5	2	1	1	3	4	3	4
Number of days with West wind.	6	4	6	5	6	3	7	7	6	4	3	6	1	3	2	4	7	4	2	2	5	6	6	4	3	4	2
Mean Thermometer Weekly.	62°	54°	64°	67°	72°	72°	72°	81°	83°	83°	80°	71°	70°	78°	76°	74°	73°	67°	63°	64°	58°	54°	50°	48°	50°	53°	46°
Mean Barometer Weekly.	29.93	30.20	30.04	29.97	30.04	30.14	29.94	29.90	29.94	29.96	30.05	30.01	30.08	30.14	29.96	30.04	29.96	30.02	30.01	29.77	29.93	29.91	30.08	30.04	29.95	30.01	30.01

THE GRAPHIC CO. N.Y.

Weekly Mortality from all Causes in Philadelphia.
Weekly Mortality from Diarrhœal Diseases in Philadelphia.
Weekly Admissions to the Centennial International Exhibition.
Weekly total Attendance at Hospital in Exhibition Grounds.
Weekly Attendance at Hospital from Diarrhœal Affections.
Mean Weekly Humidity, - Point of Saturation, 100.
Mean Weekly Thermometer.
Mean Weekly Reading of Barometer.

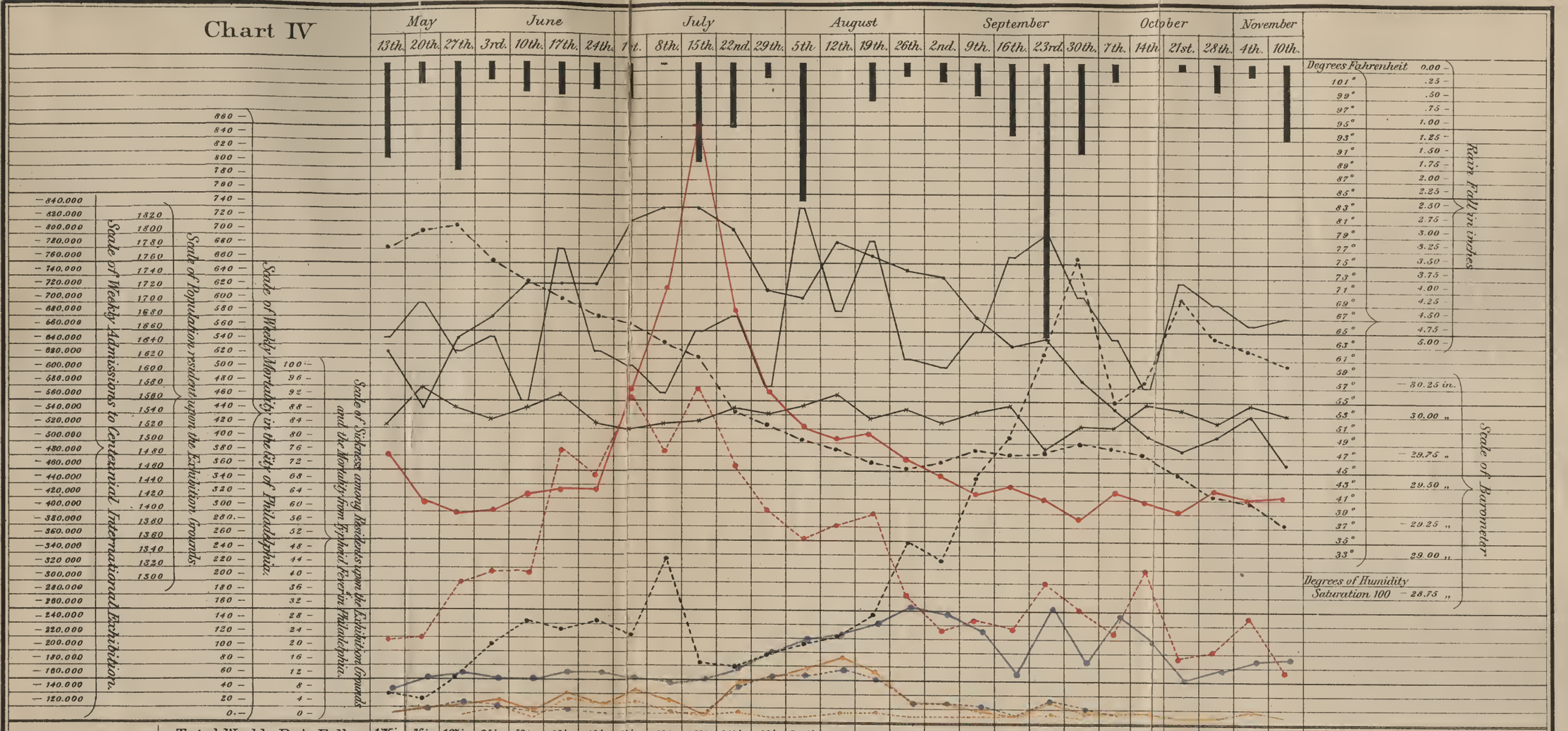
Weekly Rain Fall in inches.

January 1877.

H.

Illustrating the Weekly Population resident upon the Exhibition Grounds, the Weekly Sickness from all Causes, the Weekly Cases of all Febrile Diseases, the Weekly Cases of Intermittent Fever, the Weekly Cases of Typhoid Fever (including Typho-Malarial Fever) among the Residents upon the Exhibition Grounds, with the Weekly Mortality from Typhoid Fever in the City of Philadelphia and Meteorological Observations for the same period furnished by the U.S. Signal Office

Chart IV



	May			June				July					August				September					October				November	
	13th.	20th.	27th.	3rd.	10th.	17th.	24th.	1st.	8th.	15th.	22nd.	29th.	5th	12th.	19th.	26th.	2nd.	9th.	16th.	23rd.	30th.	7th.	14th	21st.	28th.	4th.	10th.
Total Weekly Rain Fall.	1.75in	.36in	1.97in	.35in	.52in	.55in	.48in	.63in	.03in	1.83in	1.16in	.45in	2.52in	.00in	.67in	.22in	.37in	.59in	1.31in	4.90in	1.60in	.30in	.00in	.15in	.61in	.22in	1.49in
Number of clear days.	1	3	4	3	5	1	5	5	4	2	3	2	0	2	2	2	1	2	1	0	2	5	4	4	1	5	2
Number of cloudy days.	6	4	3	4	2	6	2	2	3	5	4	5	7	5	5	5	6	5	6	7	5	2	3	3	6	2	5
Number of days with East wind.	1	3	1	2	1	2	0	0	1	3	4	1	6	4	5	3	0	3	5	5	2	1	1	3	4	3	4
Number of days with West wind.	6	4	6	5	6	3	7	7	6	4	3	6	1	3	2	4	7	4	2	2	5	6	6	4	3	4	2
Mean Thermometer Weekly.	62°	54°	64°	67°	72°	72°	72°	81°	83°	83°	80°	71°	70°	78°	76°	74°	73°	67°	65°	64°	58°	54°	50°	48°	50°	53°	46°
Mean Barometer Weekly.	29.93	30.20	30.04	29.97	30.04	30.14	29.94	29.90	29.94	29.96	30.05	30.01	30.08	30.14	29.96	30.04	29.96	30.02	30.07	29.77	29.93	29.91	30.18	30.04	29.95	30.07	30.01

Weekly Number of Persons residing upon the Exhibition Grounds.
Weekly Cases of Sickness among Residents upon the Exhibition Grounds.
Weekly Total of Cases of all Febrile diseases among Residents upon Exh.n Grounds.
Weekly Cases of Intermittent Fever among Residents upon the Exhibition Grounds.
Weekly Cases of Typhoid Fever (including Typho Malerial) among the Res.ts upon Exh.n Gr.ds
Weekly Mortality from all Causes in Philadelphia.
Weekly Mortality from Typhoid Fever in the City of Philadelphia.
Weekly Admissions to the Centennial International Exhibition.
Weekly Rain Fall in inches.
Mean Weekly Humidity - Point of Saturation 100.
Mean Weekly Thermometer.
Mean Weekly Reading of Barometer.

January 1877.

The Graphic Co. N.Y.